

Appendix D

Kautz 2025 - Impacts of the Big Cypress Detention Center on the Florida Panther
and Its Habitat

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INTRODUCTION

The Big Cypress Detention Center is a mass immigration detention facility that is being constructed on the Dade-Collier Training and Transition Airport site inside Big Cypress National Preserve near Ochopee, Florida. The project site originally was intended to become the largest airport in the world with six runways covering 39 square miles. Construction began in 1968 but was halted in 1970 due to environmental concerns after completion of just one 10,500-foot runway. The site has since seen limited use as a training facility for commercial aircraft.

The Big Cypress Detention Center is designed to provide temporary housing for up to 3,000 detainees and accommodate a staff of 1,000 that would include over 400 security guards plus legal advisors, medical personnel, clergy, laundry and maintenance workers, and administrative support. Infrastructure installed on the site includes air-conditioned tents to house detainees, housing and offices for guards and administrative staff, generators, portable toilets, fencing, night lighting, and other necessary features. Development of the site has included placing fill dirt in several locations as a base for new infrastructure and the construction of new access roads.

The project site is within the Primary Zone of the Panther Focus Area (PFA) (Figure 1). The PFA is an area identified by the U.S. Fish and Wildlife Service (USFWS) as habitats used by the endangered Florida panther (*Puma concolor coryi*), and it defines the geographic limits of the USFWS consultation area for projects that potentially affect panthers and their habitats. The Primary Zone is a region of suitable habitats occupied by Florida panthers, and it supports the only known breeding population of panthers in the world. Lands within the Primary Zone are important to the long-term viability and persistence of panthers in the wild (Kautz et al. 2006). Proposed projects in the PFA are typically reviewed by USFWS to assess potential impacts on panthers and their habitats and to determine mitigation requirements, if any. The purpose of this report is to review the development plans for the Big Cypress Detention Center and to assess panther habitat impacts of the project.

PANTHER STATUS AND BIOLOGY

Panther Legal Status: The Florida panther is a wide-ranging predator listed as endangered under the U.S. Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA). The ESA

defines endangered as any species that is in danger of extinction throughout all or a significant portion of its range. The ESA protects endangered species and their habitats by prohibiting the "take" of listed animals except under a Federal permit. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." The Florida Fish and Wildlife Conservation Commission [FFWCC] lists the Florida panther as a Federally-designated Endangered Species (68A-27.003, *Florida Administrative Code*), which is defined by the State of Florida as "species of fish or wild animal life, subspecies or isolated populations of species or subspecies, whether vertebrate or invertebrate, that are native to Florida and classified as Endangered and Threatened under Commission rule by virtue of designation by the United States Departments of Interior or Commerce as endangered or threatened under the Federal Endangered Species Act, 16 U.S.C. § 1532 et seq. and rules thereto..." (68A-27.001(2) *Florida Administrative Code*). State rules pertaining to take are similar to those defined in the ESA.

Panther Distribution: The range of the Florida panther includes all counties of peninsular Florida south of I-4 plus Flagler, St. Johns, and Putnam counties along the northeast coast based on Very High Frequency (VHF) and Global Positioning System (GPS) telemetry records, mortality records, verified sightings, and wildlife camera detections. Most panthers are members of a single breeding population located in southern Florida, and they comprise the only breeding population of pumas east of the Mississippi River (Kautz et al. 2006, USFWS 2008, Frakes et al. 2015). Until recently, panthers that had been documented north of the Caloosahatchee River had been dispersing adult and sub-adult males. However, two adult female panthers, one with kittens, were confirmed north of the Caloosahatchee River in 2017, one on Babcock Ranch Preserve (BRP) (Charlotte County) and one on Platt Branch Wildlife and Environmental Area (Highlands County). These were the first times that females had been confirmed north of the Caloosahatchee River since a female was captured in Glades County in 1973 (Nowak and McBride 1973, FFWCC 2017). While the absence of the original female at BRP has been confirmed, wildlife cameras detected a new female in eastern BRP, another female was photographed at Fisheating Creek (FEC) in Glades County, and a dependent-aged panther was confirmed at Bob Janes Preserve in Lee County (Kelly and Onorato 2021). Males were photographed in the company of the females in spring 2020, a likely indication of reproduction. If current levels of panther activity are sustained and recruitment can be documented at BRP and FEC, it would suggest that eastern Charlotte County and western Glades County may support a reproductively viable portion of the panther population (Kelly and Onorato 2021).

Population Size: The current panther population consists of 120 to 230 adults and subadults (FFWCC 2024). Panthers were widely distributed throughout the southeastern United States prior to European colonization. However, by the late 1980s and early 1990s, the Florida panther population had been reduced to 20-30 animals south of the Caloosahatchee River following two centuries of persecution, bounty hunting, and habitat loss (Onorato et al. 2010). Fearing that the small and inbred panther population was in imminent danger of extinction, 8 female pumas from Texas were introduced into the south Florida population in 1995 to restore the genetic viability of the panther population. The project has been deemed a success as evidenced by restored genetic

vigor and the increasing size of the panther population (Johnson et al. 2010, Hostetler et al. 2013, van de Kerk et al. 2019, Onorato et al. 2024).

Population Viability: Recent population viability analysis (PVA) models assessed the likelihood that the current population of panthers could survive for the next 100 years (Hostetler et al. 2013, van de Kerk et al. 2019). Both models indicated that (1) the panther population is characterized by a positive growth rate, (2) population growth rate is most sensitive to survival, especially kitten survival, and (3) probability of quasi-extinction in the next 100 years was 7.2% (Hostetler et al. 2013) and 1.4% (van de Kerk et al. 2019) when demographic factors alone are considered. However, quasi-extinction rose to 17% in the next 100 years when incorporating the impacts of genetic erosion (van de Kerk et al. 2019). Quasi-extinction occurs when the modeled population reaches a critical size below which recovery is so unlikely that the population will eventually go extinct. The critical population size for quasi-extinction in the PVA models was set at 10 individuals. Releasing 5-10 female western pumas into the Florida population every 20-40 years was found to be the most cost-effective means to combat the effects of inbreeding depression (van de Kerk et al. 2019). Both models assumed that current conditions remain stable in the future and neither accounted for risks associated with loss of habitat.

The van de Kerk et al. (2019) PVA models used a starting population of 146 panthers. The population was projected to increase to 182 adults and subadults after 9 years; the population grew to a projected size of 187 adults and subadults (142–218, 95% CI) with a cumulative probability of quasi-extinction (PQE) ($N = 10$ panthers) of 0.72 percent (0–0.31 5th and 95th percentiles) by 2070; and the population remained stable at a projected 188 adults and subadults after 200 years. These results can be interpreted as showing that the current population would grow by approximately 28% in 10 years and would persist with a very low PQE for the next 50 (2070) years and beyond, should conditions remain constant. A panther population of 146-187 adults and subadults should have a high probability of persistence per the results of van de Kerk et al. (2019) assuming no further loss of habitat or the occurrence of catastrophic events (e.g., disease).

Although these PVA models present a favorable picture for the future of the panther in South Florida, recent real-world evidence suggests that there are reasons to be concerned. In response to the effort to restore genetic diversity, the panther population increased steadily from 1995 to 2016. However, the population peaked in 2016, and panther numbers declined between 2016 and 2020 (Onorato et al. 2024).

Cover Types Used by Panthers: All types of upland and wetland forest comprise the primary land cover type used by panthers (Belden et al. 1988, Maehr and Cox 1995, Comiskey et al. 2002, Cox et al. 2006, Kautz et al. 2006, Land et al. 2008, Onorato et al. 2011). Florida panthers use forest patches of all sizes regardless of type (Kautz et al. 2006, Onorato et al. 2011). Panthers may use the edge of forested habitat as stalking cover to ambush white-tailed deer (*Odocoileus virginianus*) or feral hogs (*Sus scrofa*) feeding in open areas and then drag the kill into forests or other types of dense cover to feed (Onorato et al. 2011). Non-forest but densely vegetated habitats also provide sufficient cover for panthers (Onorato et al. 2011). Examples of these cover types range from thick patches of tall sawgrass (*Cladium jamaicense*) to expanses of mature saw palmetto (*Serenoa*

repens) adjacent to pine (*Pinus* spp.) or oak (*Quercus* spp.) forests (McBride 2001, Onorato et al. 2011).

In addition to forested habitats, panthers selected dense vegetative cover types including herbaceous wetlands, shrub swamp wetlands, and prairie grassland habitats based on GPS telemetry data (Onorato et al. 2011). Panthers also used agricultural and other habitats in proportion to their availability (Onorato et al. 2011).

Distance Metrics: GPS telemetry data revealed that 41 percent of panther locations occurred outside of forest cover; 74 percent of locations were within 100 m of forest cover; and 85 percent of locations were within 200 m (Onorato et al. 2011). The mean spatial error of VHF telemetry locations was 123.9 m (SE = 13.9, $n = 45$, range = 9.1–363.4) (Land et al. 2008). Pumas in California dragged carcasses of large mammals 0–80 m from kill sites to cover to feed, and in one case a puma dragged a carcass 350 m before feeding (Beier et al. 1995). Pumas in Alberta, Canada, demonstrated strong avoidance for habitat <270 m from buildings during the day, but at night pumas avoided areas <210 m from buildings (Knopff et al. 2014). Building developments where the distance between buildings is <210 m will likely restrict puma use of the area (Knopff et al. 2014). Mean daily travel distances for Florida panthers ranged from 2.62–6.70 km depending on gender and season (Criffield et al. 2018).

Landscape Used by Panthers in South Florida: A large landscape south of the Caloosahatchee River covering approximately 12,588 km² (3.11 million acres) was identified by Kautz et al. (2006) as regionally significant panther habitats (Figure 1). This region included three specific areas: (1) a Primary Zone defined as occupied high-quality panther habitats covering 9189 km² (2.27 million acres); (2) a Secondary Zone of lower quality landscapes occasionally used by transient animals (3287 km² [0.81 million acres]); and (3) a Dispersal Zone, a wildlife corridor of 113 km² (27,880 acres) leading into Central Florida. Kautz et al. (2006) recommended that assessments of potential impacts of proposed developments within the Primary Zone should strive to achieve no net loss of landscape function or carrying capacity for panthers within the Primary Zone and that the total areal extent of the Primary Zone should be maintained. A smaller area that functions as the core range of breeding-age adult panthers comprises approximately 5579 km² (1.38 million acres), most of which is within the Primary Zone south of the Caloosahatchee River (Figure 2) (Frakes et al. 2015).

Threats to Panther Survival: Habitat loss associated with an expanding human population has been identified as a key factor affecting the long-term survival and recovery of the Florida panther (Maehr 1992, USFWS 2008, Onorato et al. 2010, van de Kerk et al. 2019). Specific types of habitat loss frequently mentioned include conversion of natural lands, particularly forest cover, to agriculture or urban development, road construction, dredging of artificial surface water drainage systems, and mining. These types of human activities not only destroy panther habitats, but they also degrade the quality of remaining habitats, or they fragment and isolate remaining patches such that they are smaller, farther apart, and isolated from areas panthers may use. Other factors that threaten the continued existence of the panther include collisions with motor vehicles; removal from the wild of panthers that prey on hobby animals, livestock, or domestic pets; panther-human

conflicts and human intolerance due to public safety concerns; diseases and environmental contaminants; and illegal shootings.

Pumas and Roads: Pumas utilize fire roads, dirt roads, and other low-speed or low use roadways, and have been observed crossing two-lane paved roads (Dickson et al. 2005, Wilmers et al. 2013). Florida panthers use old logging trams, swamp buggy ruts, and fire breaks (McBride et al. 2008). Puma movements are limited by high-speed roadways, highways, and interstates (Dickson et al. 2005, Wilmers et al. 2013, Knopff et al. 2014, Gray et al. 2016), but pumas in wilderness areas of Alberta, Canada, switched from avoiding areas of high road density during the day to selecting them at night (Knopff et al. 2014).

High-speed highways are often considered to be a source of habitat fragmentation and a leading cause of puma road mortality (Onorato et al. 2010, Frakes et al. 2015). Wildlife crossings have been installed in strategic locations along some interstates and other high-volume roadways in Florida to reduce road mortality of panthers and other species of wildlife (e.g., Interstate 75 [I-75], I-4, Suncoast Expressway, State Road 29, and State Road 46). Underpasses or overpasses have been installed on many high-speed highways to maintain farm connectivity on either side of the highway, and panthers have the potential to use these crossings to avoid collisions with motor vehicles. Mowed rights-of-way along road corridors, cleared land around buildings, agricultural fields, and gardens often provide prime foraging habitat for ungulates, especially white-tailed deer, a primary prey species of panthers (Rea 2003). In summary, although high-speed roadways present a higher risk of mortality to panthers on the move, such roads are nonetheless somewhat permeable, may allow for some panther movements that maintain connectivity among potentially suitable habitats throughout Florida, and may attract prey to open roadside edges.

Pumas, including Florida panthers, have demonstrated a negative response to increasing road density (i.e., length of roads per unit area) (Burdett et al. 2010, Wilmers et al. 2013, Knopff et al. 2014, Frakes et al. 2015, Yovovich et al. 2023). Frakes et al. (2015) found that, out of 15 variables, human population density followed by wetland forest had the greatest influence on probability of panther occurrence whereas road density was of medium importance to predicting the suitability of panther habitats in Florida.

Road and Highway Mortality: From February 10, 1982, through February 28, 2018, the leading cause of mortality of **radio-collared** panthers was intraspecific aggression, which accounted for 40% of recorded mortalities (Onorato et al. 2010). During this period, the second leading cause of mortality of **radio-collared** panthers was collisions with motor vehicles, which accounted for 21% of known mortalities. However, when records of radio-collared and uncollared panthers are pooled, vehicle collisions accounted for 60% of all panther mortalities recorded during this period (FFWCC unpublished data). Vehicle mortalities have risen since 2000 as the panther population has increased following the introduction of 8 female pumas from Texas into South Florida in the mid-1990s. Prior to 2000, panther roadkills were 4 or fewer per year, but since 2000, these numbers have ranged from 6 to 34 annually (Figure 3). The deadliest year for panther roadkills was 2016 when 34 vehicle mortalities were documented. In 2024, 28 panthers died by collisions with motor vehicles.

Multiple roadkill mortalities have been recorded along US 41 (Tamiami Trail) west and south of the project site (Figure 4). Least cost path modeling has been used by FFWCC to identify travel pathways likely to be followed by panthers moving from Big Cypress National Preserve to Everglades National Park (Swanson et al. 2008). This work identified several priority road segments along US 41 that might be candidates for construction of road crossings to minimize the likelihood of panther roadkills in the future. Several priority road segments occur in the vicinity of the project site (Figure 4).

Puma Response to Human Developments: Pumas have been shown to respond to a gradient of human development in regions as diverse as Washington state; Alberta, Canada; the front range of the Colorado Rockies; the Santa Cruz and Santa Monica Mountains of California; and South Florida (Kertson et al. 2013, Wilmers et al. 2013, Knopff et al. 2014, Frakes et al. 2015, Moss et al. 2016, Maletzke et al. 2017, Blecha et al. 2018, Alldredge et al. 2019, Yovovich et al. 2020, Riley et al. 2021). A comprehensive literature review of human-puma interactions revealed that puma use of areas with residential development is commonplace, but interactions with people occur infrequently relative to the intensity of this use. As residential density increases, puma use decreases and home range size increases. Puma use of highly urban landscapes is rare.

Landscaped open spaces within developed areas, such as cemeteries, golf courses, or parks, may be avoided, perhaps due to a lack of cover (Riley et al. 2021). Greater amounts of forest, increased proximity to wildlands and open space, greater terrain complexity, and fewer houses or greater distance to residential development were consistently associated with increased puma presence in developed portions of the landscape (Human-Cougar Interactions Science Review Team et al. 2022). However, pumas in the Santa Monica Mountains of southern California selected areas closer to development than expected by chance, likely related to the presence of mule deer (*Odocoileus hemionus*) or other prey in or adjacent to urbanization (Riley et al. 2021). Additionally, pumas can and do find their way through some intensively developed areas often using thin strips of vegetation.

Numerous studies in the western United States cited above have assessed puma use of the landscape according to a scale of residential density developed by Theobald (2005), who defined the following categories of land development: (1) urban lands have >10 dwelling units per ha, (2) suburban lands have 1.47–10 dwelling units per ha, (3) exurban lands have 0.062–1.47 dwelling units per ha, and (4) rural areas have <0.062 dwelling units per ha. Burdett et al. (2010) added a fifth category of undeveloped lands which have zero dwelling units per ha.

In general, these studies found that pumas generally occur in landscapes with a dwelling unit density of <0.062 dwelling units per ha (i.e., areas characterized as undeveloped or rural by Theobald et al. [2005]). Pumas that did occur in exurban areas were at greater risk of mortality, were more likely to be younger than 5 years of age, were more likely to approach housing as hunger increased, and were more likely to include synanthropic wildlife (i.e., species that live near humans and benefit from human-modified environments) and domestic species in their diet. Florida panthers regularly occur in the exurban residential landscape of the 230-km² Golden Gate Estates (GGE) in Collier County where there is an average of 0.40 residences per ha. The occurrence of

panthers in this area is a continuing source of human-panther conflicts and depredations on domestic pets and livestock (Interagency Florida Panther Response Team 2017). Puma occurrence in suburban or urban environments is uncommon.

Puma Response to Artificial Lighting: Pumas tend to avoid areas with artificial light, especially bright or unpredictable lighting. Studies using trail cameras have shown that puma activity decreases near well-lit areas, especially in regions close to human development. Work in southern California showed a pronounced avoidance of artificial lighting within 500 m of the light source; however, there is marked individual variation in tolerance (Barrientos et al. 2023). In contrast to artificial lighting, neither sky glow nor moonlight significantly affect habitat selection. In a study in the intermountain Southwest, mule deer were drawn to light-rich areas near human developments, but hunting by pumas was restricted to darker areas (Ditmer et al. 2020).

POPULATION GROWTH AND SEA LEVEL RISE 2070

Future Growth and Development in Southwest Florida: The population of Lee, Collier, and Hendry counties where most of the occupied panther habitat occurs is expected to increase from 1,233,723 to 2,252,721 residents between 2022 and 2070, a projected increase of 1,018,998 new residents (Carr and Zwick 2016, BEBR 2023). To identify areas of Florida most likely to absorb future growth, the University of Florida Center for Landscape Conservation Planning and 1000 Friends of Florida [CLCP-1000 FOF] (2023) developed models of future growth through 2070 assuming current development patterns continue, and no additional land conservation occurs.

Sea Level Rise: Relative sea level along the contiguous United States coastline is expected to rise on average as much over the next 30 years (0.25–0.30 m between 2020–2050) as it has over the last 100 years (1920–2020). Scenarios of sea level rise by 2100 relative to a baseline of the year 2000 were reported for coastal regions of the U.S. by Sweet et al. (2022). The median sea level rise for the Intermediate scenario for the Eastern Gulf coast, which includes the Southwest Florida study area, was 1.2 m (low 0.6 m – high 2.2 m) by 2100.

Estimates of Panther Habitat Loss in South Florida by 2070: Kautz et al. (in preparation) created a model of panther habitats in Southwest Florida (Figure 5) for inclusion in the Florida Panther Species Status Assessment Version 2.0 (FWS in review). The CLCP-1000 FOF (2023) model of future growth in Florida was overlain on the panther habitat model for South Florida to predict loss of panther habitat by 2070. A separate model was used to estimate loss of panther habitat due to sea level rise of 0.9 m by 2070. The results of these analyses were combined to calculate the total loss of panther habitats due to population growth and sea level rise in south Florida through 2070.

The 2070 growth model would result in the loss of 487 km² (9.8 percent) of the area mapped as panther habitat in Southwest Florida by Kautz et al. (in preparation). Sea level rise of 0.9 m by 2070 would result in the loss of 151 km² (3.6 percent) of panther habitat in Southwest Florida. The combined effects of population growth and sea level rise models predict the loss of 638 km² (12.9 percent) of panther habitat in Southwest by 2070.

Habitat loss may result in fragmentation, which is the subdivision of a single large area of habitat into several smaller areas with the remaining areas becoming farther away from one another or even isolated (i.e., loss of connectivity) (Lindenmayer and Fischer 2006). An analysis of fragmentation effects on habitat patches remaining after habitat loss revealed that the Corkscrew Regional Ecosystem Watershed habitat area will become too small and isolated to support panthers, and remaining habitat patches in Southwest Florida will be reduced by 19 percent of the area existing in 2022. Consequently, remaining habitat patches in 2070 would have the capacity to support 55-162 panthers (Kautz et al. in preparation). These numbers may be compared to the current estimated population of 120-230 panthers (FWC 2024) and to the range of 146-187 panthers needed for a viable population based on the models of van de Kerk et al. (2019). If habitats remaining in 2070 are of high quality, the future panther population may remain viable. However, if lower quality habitats remain, the future number of panthers may be so low that persistence of the panther population is in doubt.

BIG CYPRESS DETENTION CENTER PROJECT SITE AND PANTHER OCCURRENCE

Big Cypress Detention Center and Surrounding Landscape: Prior to construction of the detention center, the project site consisted of 350.65 acres of paved runway, taxiways, and adjacent grassy edges based on the polygon of the site extracted from the Cooperative Land Cover database version 3.8, December 2024, downloaded from the FWC website. The project site is in the Big Cypress Swamp province of the Southwestern Flatwoods physiographic district (Brooks 1981). This area is described as a rockland and marl plain with elevations largely below 16 feet and vegetation dominated by wet to dry prairies, marshes, and stunted cypress (Brooks 1981). Soils within 1 mile of the project site are dominated by types that typically support herbaceous freshwater marsh species (73%) with scattered low ridges that support oaks (*Quercus* spp.), tropical hardwoods, cabbage palms (*Sabal palmetto*) and other species in their native state (Table 1). Land cover types within 1 mile of the site are dominated by wetlands, primarily freshwater marsh (90%) but also include human-derived features associated with the project site (7%), rockland hammock (1.6%), and water in borrow pits (1%) (Table 2).

Panther Occurrences Near the Big Cypress Detention Center Site: The Big Cypress Detention Center site is in the southeastern corner of an expansive region of Southwest Florida that is occupied by Florida panthers based on data collected since 1982 (Figure 4). Panther use of the site and surrounding area was assessed by using a 6701 m buffer (i.e., the mean daily distance traveled by male panthers during the dry season [Criffield et al. 2018]) to select VHF telemetry records collected by FFWCC, Big Cypress National Preserve, and Everglades National Park biologists between 1982 and 2014 (Table 3, Figure 5). These panthers would have a high likelihood of easily traveling to the site in a single day.

Telemetry records within the buffer include 1164 points representing 12 male panthers, 10 females, and 1 Texas female introduced into the southwest Florida population as part of the effort to restore genetic diversity to the population in the 1990s. In addition, there are records of 4

panther dens within 12 km to the northwest, west, and southwest of the site (Figure 5). These data indicate that panthers have occurred consistently in the landscape immediately surrounding the site for over a 30-year period since data collection first began in 1982. The lack of records since 2014 is not because panthers no longer occur in the area but because federal budget constraints led to discontinuous monitoring by BCNP staff beginning in March 2013 (FFWCC 2020). Limited monitoring of some panthers in BCNP continued through June 2018 but the panthers that were monitored were not in the vicinity of the project site between 2014 and 2018. The panthers that have used the area around the site during the period of record are represented by all age classes of both sexes from juvenile to older adults (Table 3), indicating that the surrounding landscape has supported a stable and reproducing population of panthers over many years.

Although no panthers have been recorded on the paved areas of the project site, 3 individuals have occurred within 70-300 m of the site. Moreover, the minimum convex polygon home ranges of 8 of 11 males and 4 of 10 females overlap the site. These data suggest that it is very likely that panthers traverse the paved areas during periods of movement based on evidence that they readily cross paved roads, often use unpaved roads as travelways, and multiple home ranges defined by telemetry records overlap the site.

IMPACTS OF BIG CYPRESS DETENTION CENTER PROJECT ON FLORIDA PANTHERS

Increased Human Presence: The Big Cypress Detention Center will increase the presence of humans in a landscape that is relatively wild and that is part of the range of the only viable population of Florida panthers on earth. Studies in Florida and elsewhere have demonstrated that the presence of pumas decreases with increasing human presence as measured by either residential density or human population density. Although it is difficult to determine how the human population of the detention center compares with data on residential density, it is highly likely that the increased density of humans will reduce the value of natural areas surrounding the site as panther habitat. Studies have shown that pumas in Canada avoided areas within 270 m of buildings during the day, but at night avoided areas within 210 m of buildings. Thus, natural habitats within 210 m of the project site, a total area of 1024 acres including the previously paved areas, may receive less use by panthers than occurs without the presence of the detention facility. However, individual panthers may well approach more closely, particularly at night or in pursuit of prey based on panther/puma behavior observed in Florida and elsewhere.

Fencing: Although panthers and their primary prey species, white-tailed deer, can leap 4-foot-high farm field fencing, chain link fencing 6 feet and higher precludes use of bounded areas by panthers and deer, especially when topped by barbed wire outriggers or razor wire. Thus, all areas of the Big site enclosed by fencing will become unusable by panthers and their prey. Although paved areas would not normally be considered as panther habitats, panthers nevertheless likely cross the paved areas of the site in search of prey or during their normal movement patterns. In their reviews of the construction of solar electric generating facilities in the Panther Focus Area, USFWS

biologists regard all areas surrounded by 6-foot chain link fencing as a complete loss of habitat, and mitigation is recommended at a ratio of 2:1 for impacts within the Primary Zone.

Artificial Lighting: A key security feature of the Big Cypress Detention Center is the installation of bright artificial night lighting throughout the site. Studies in California and the intermountain West have shown that pumas typically avoid areas within 500 m of bright sources of artificial lighting, but there is individual variation in puma response. This information suggests that panthers may not venture within 500 m of the Big Cypress Detention Center site during the periods when they are most actively searching for prey. The total affected area within a 500 m buffer around the site covers 1895 acres including the paved area of the site.

Road Mortality: Highway traffic associated with guards, administrative staff, detainees, food service personnel, maintenance workers, portable toilet services, etc., traveling to and from the site will increase. The increase in highway traffic on US 41 and other highways leading to the site, such as SR 29, is likely to increase the number of panthers killed in collisions with motor vehicles. Panther highway mortality rates are higher on major roads, such as I-75, US 41 and SR 29, than on minor roads (e.g., residential streets, unpaved roads, trails) (Schwab and Zandbergen 2011). Data downloaded from the Florida Department of Transportation web site shows that Average Annual Daily Traffic (AADT) on US 41 west of the project site ranged 3,400-3,800 AADT but east of the site 6,300 vehicles per day were documented in 2024. Smith (2019) reported that panther-vehicle collisions occurred on roads with 450 AADT but mortality rates were higher on roads with 4,400-7,800 AADT. US 41 lacks dedicated wildlife crossings that would prevent or reduce the risk of additional mortalities. Collisions with motor vehicles are the most significant factor affecting the survival of individual panthers. Approximately 13-25% of the estimated population of 120-230 panthers die each year in collisions with motor vehicles. Increased vehicular traffic to and from the site, particularly from the west, is likely to increase the danger to panthers in a road segment that already has AADT rates that put panthers at risk to traffic-related mortality.

Cumulative Loss of Panther Habitat 2070: Panther habitat, human population growth, and sea level rise models indicate the loss of 19 percent of panther habitat in Southwest Florida by 2070. This amount of habitat loss has the potential to jeopardize the persistence of panthers in the future depending on the quality of remaining habitats. High quality habitats have the potential to support a small but viable population by 2070, but, if lower quality habitats remain, the future persistence of the panther population is in doubt. The Big Cypress Detention Center project has the potential to result in the loss of approximately 1000-2000 acres of habitat in a remote area of occupied panther habitat in South Florida due to the effects increased human presence and artificial lighting extending into surrounding natural habitats. The project would, thus, contribute to the cumulative loss and degradation of panther habitat into the future.

SUMMARY

The Big Cypress Detention Center is being constructed in a remote area of South Florida home to the only population of endangered Florida panthers in the world. Panther use of the area immediately surrounding the site is well documented. The project is likely to adversely affect panther use of existing natural habitats in an area of at least 1024-1895 acres surrounding the site because of loss of habitat to panthers due to indirect impacts associated with human presence and artificial lighting. Increased traffic to and from the site is likely to increase panther roadkill mortality adding further strain to a population that appears to be in decline. This project will contribute to the cumulative loss, fragmentation, and degradation of panther habitats predicted by available models of future growth and development, sea level rise, and panther habitats. The combined effects of habitat loss, degradation, and fragmentation have the potential to jeopardize the viability of the panther population in the future depending on the quality of habitats remaining by 2070.

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Table 1. Soil type within 1 mile of the Big Cypress Detention Center and types of vegetation typically supported by each.

Soil Type	Acres	Percent	Vegetation/Land Cover
Biscayne-Rock Outcrop Complex	4,596.62	72.76	Freshwater marsh with limestone outcrops
Ravenwood-Boca-Urban Land Complex	1,183.04	18.73	Fill areas on poorly drained wetlands
Rattlesnake Ridge-Shark Valley-Hallandale Complex	282.36	4.47	Mixed freshwater marsh, wet flatwoods
Rattlesnake Ridge	158.05	2.50	Low oak-cabbage palm hammock
Cooper Town-Perrine-Rattlesnake Ridge Complex	97.47	1.54	Freshwater marsh, pond apple, cypress
Total	6,317.54	100.00	

Table 2. Land use/land cover types within 1 mile of the Big Cypress Detention Center based on data contained in the Cooperative Land Cover database version 3.8 (December 2024) downloaded from the Florida Fish and Wildlife Conservation Commission website.

Land Cover Type	Acres	Percent
Wetlands	5,708.30	90.36
Glades Marsh	4,275.08	67.67
Cypress	1,129.97	17.89
Mixed Scrub-Shrub Wetland	134.28	2.13
Isolated Freshwater Swamp	59.70	0.94
Mixed Hardwood-Coniferous Swamps	30.14	0.48
Marshes	22.96	0.36
Cypress/Pine/Cabbage Palm	17.34	0.27
Other Hardwood Wetlands	12.47	0.20
Marl Prairie	11.09	0.18
Prairie Hydric Hammock	7.79	0.12
Cypress/Tupelo (including mixed Cypress/Tupelo)	7.49	0.12
Uplands	103.00	1.63
Rockland Hammock	103.00	1.63
Cultural	440.74	6.98
Transportation	364.05	5.76
Vegetative Berm	40.81	0.65
Rural Open	13.46	0.21
Extractive	13.00	0.21
Exotic Plants	9.41	0.15
Water	65.47	1.04
Artificial Impoundment/Reservoir	65.47	1.04
Grand Total	6,317.51	100.00

Table 3. Florida panther VHF-telemetry records within 6701 m of the Big Cypress Detention Center in Collier County, FL. Records are from 12 male and 10 female panthers and 1 female Texas panther from the genetic restoration effort in the 1990s.

Cat ID	Sex	Points	First Date	Last Date	Age
FP007	M	13	1982-06-09	1982-10-26	6-7 yr
FP016	M	112	1989-08-03	1994-10-06	3-9 yr
FP023	F	116	1990-03-17	2000-05-31	2-12 yr
FP038	F	85	1990-02-18	1994-05-26	4-8 yr
FP042	M	22	1991-09-13	1994-11-11	2-5 yr
FP079	M	32	1999-04-19	2005-11-16	3-9 yr
FP086	F	8	2001-01-08	2001-10-17	1.5-2 yr
FP087	F	3	2000-07-03	2001-06-15	1.3-2 yr
FP088	F	22	2001-05-04	2002-10-18	1-2.3 yr
FP091	F	1	2001-03-16	2001-03-16	9 mo
FP103	F	375	2001-05-27	2007-07-11	9 mo-7 yr
FP104	M	166	2002-01-16	2006-03-08	1.5-5 yr
FP108	M	55	2002-03-04	2002-11-13	2-2.5 yr
FP124	F	22	2004-03-29	2008-03-28	4-8 yr
FP125	M	6	2004-03-29	2004-05-10	9-11 mo
FP126	M	12	2004-03-29	2004-05-26	9-11 mo
FP127	M	51	2006-03-31	2008-02-16	6-8 yr
FP129	F	21	2004-02-25	2006-02-22	3-5 yr
FP152	M	23	2007-05-04	2008-10-12	5-6 yr
FP169	M	5	2009-05-06	2009-11-30	5-5.5 yr
FP192	F	2	2014-03-31	2014-08-28	5-5.5 yr
FP230	M	1	2014-04-14	2014-04-14	6 yr
TX103	F	11	1998-08-21	1999-07-09	-
Total		1,164			

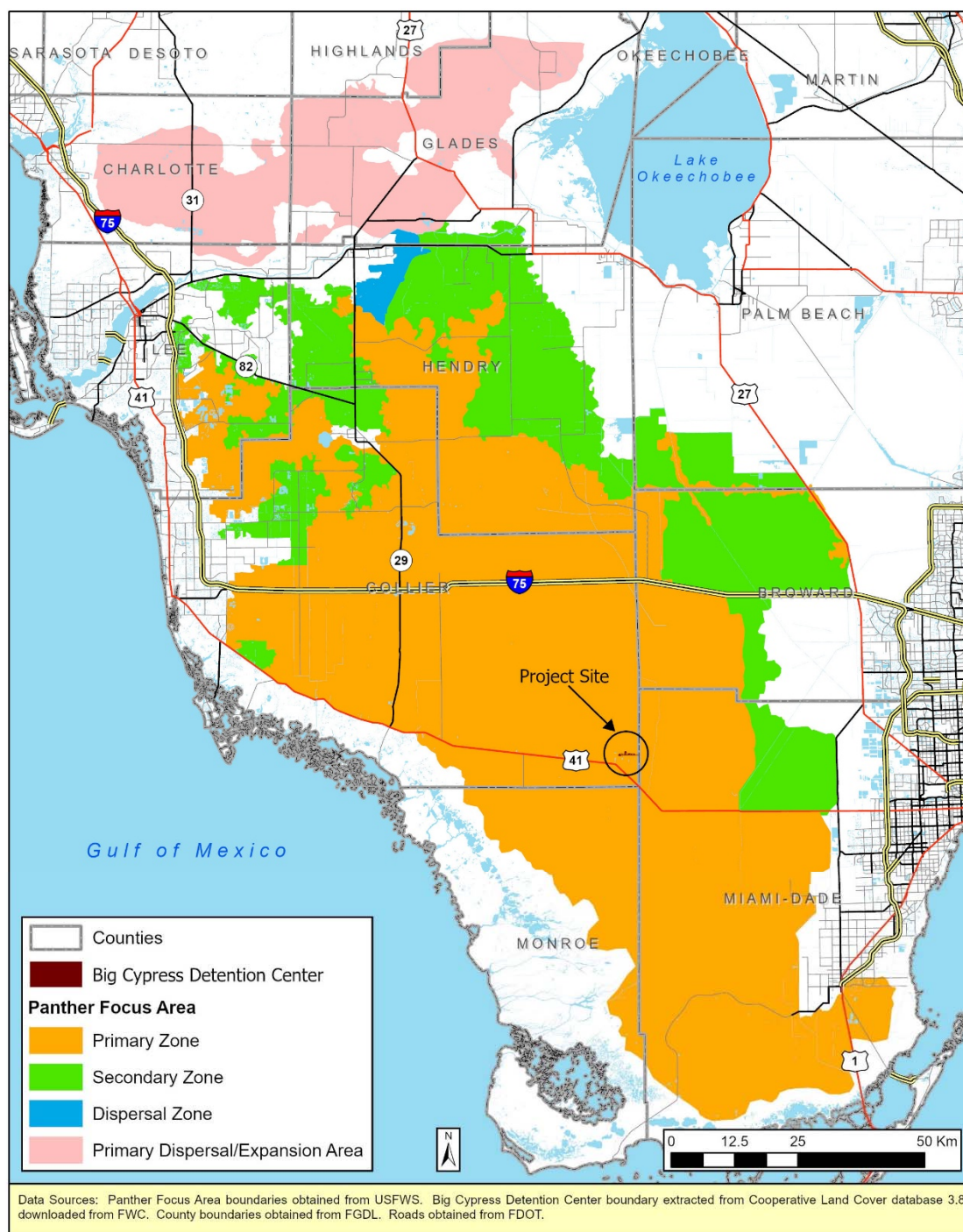


Figure 1. The Big Cypress Detention Center is in the Primary Zone of the U.S. Fish and Wildlife Service's Panther Focus Area.

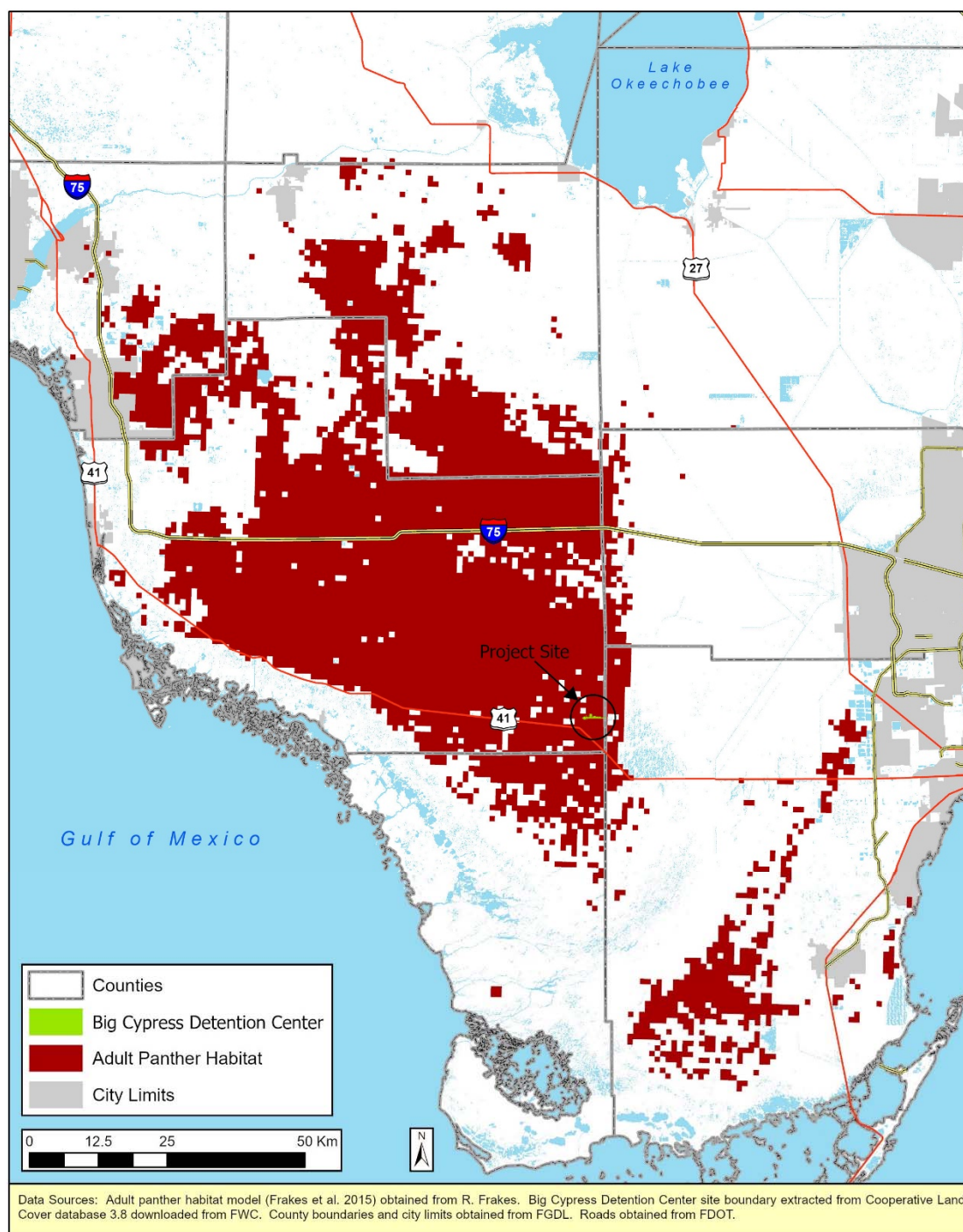


Figure 2. The Big Cypress Detention Center is in an area mapped as adult breeding habitat by Frakes et al. (2015).

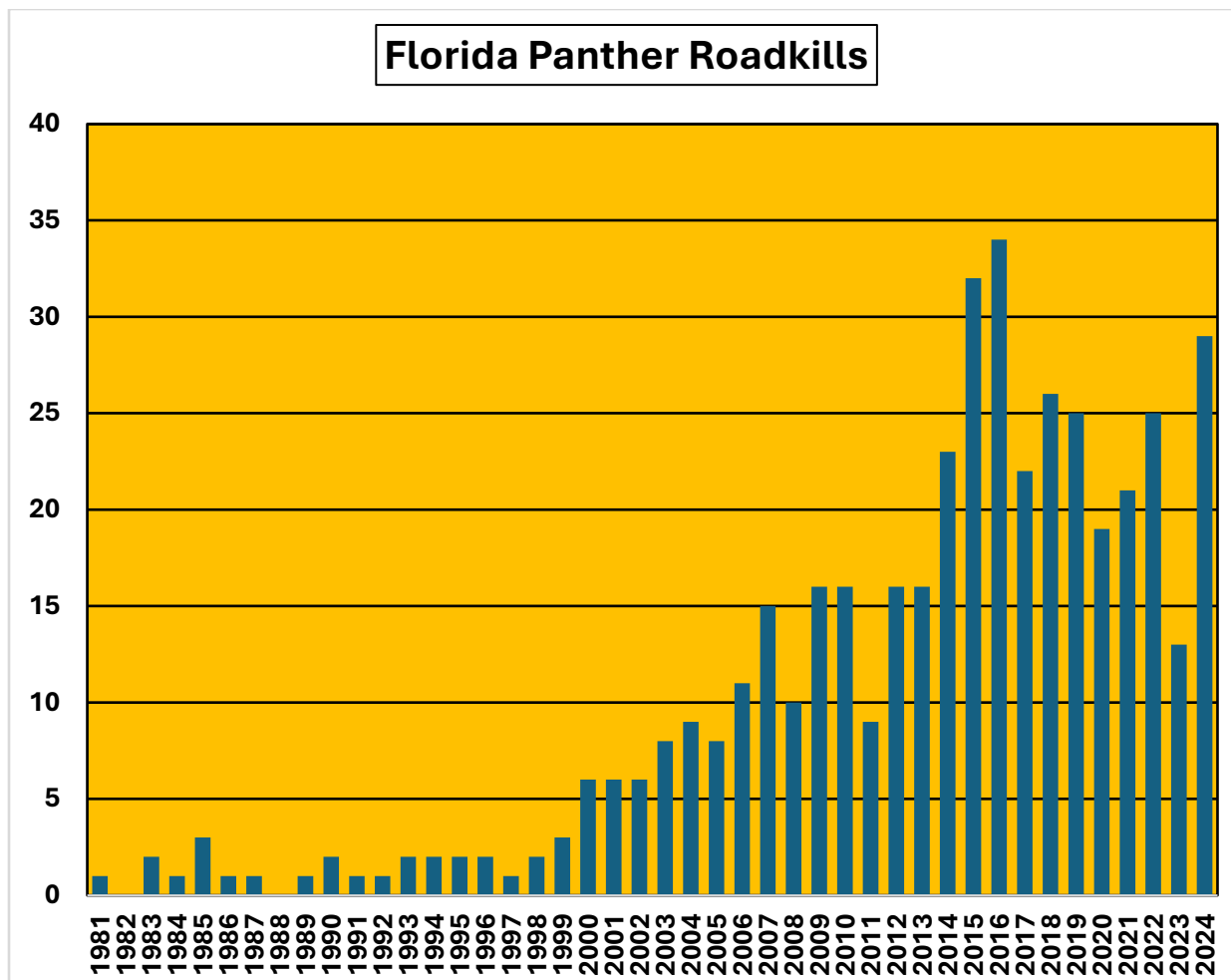


Figure 3. Number of Florida panthers killed in collisions with motor vehicles each year between 1981 and 2024. Data are inclusive of panthers of all age groups from dependent kittens to adults.



Figure 4. The Big Cypress Detention Center is near US 41 (Tamiami Trail) in an area where roadkill mortalities have been recorded and where priority road segments for reducing roadkill mortality based on least cost path modeling (Swanson et al. 2008). Average daily traffic on US 41 west of the site was 3,400-3,800 vehicles per day and east of the site was 6,300 vehicles per day in 2024.

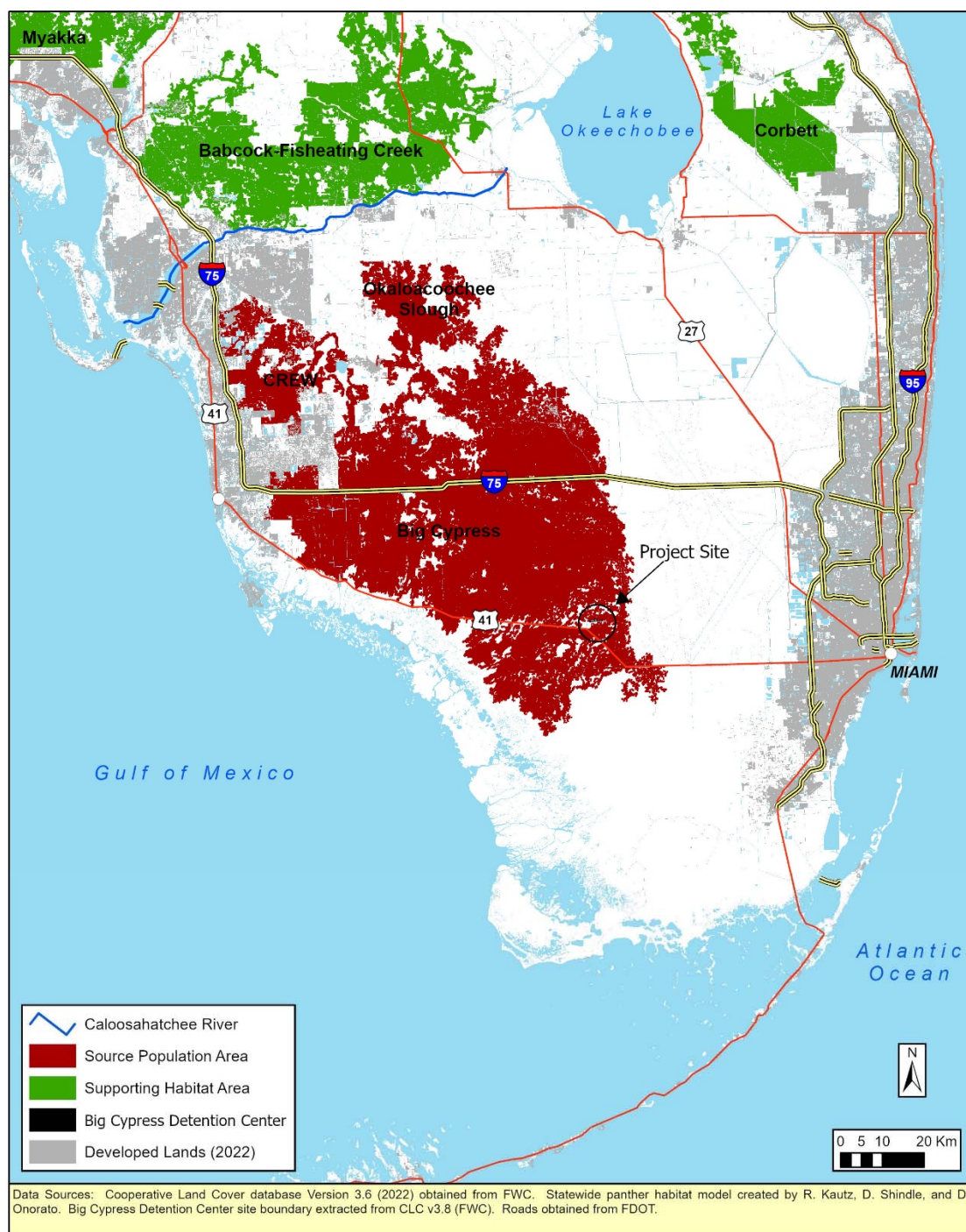


Figure 5. Big Cypress Detention Center project site in relation to panther habitat as modeled by Kautz et al. (in preparation) for the Florida Panther Species Status Assessment Version 2.0 (USFWS in review).

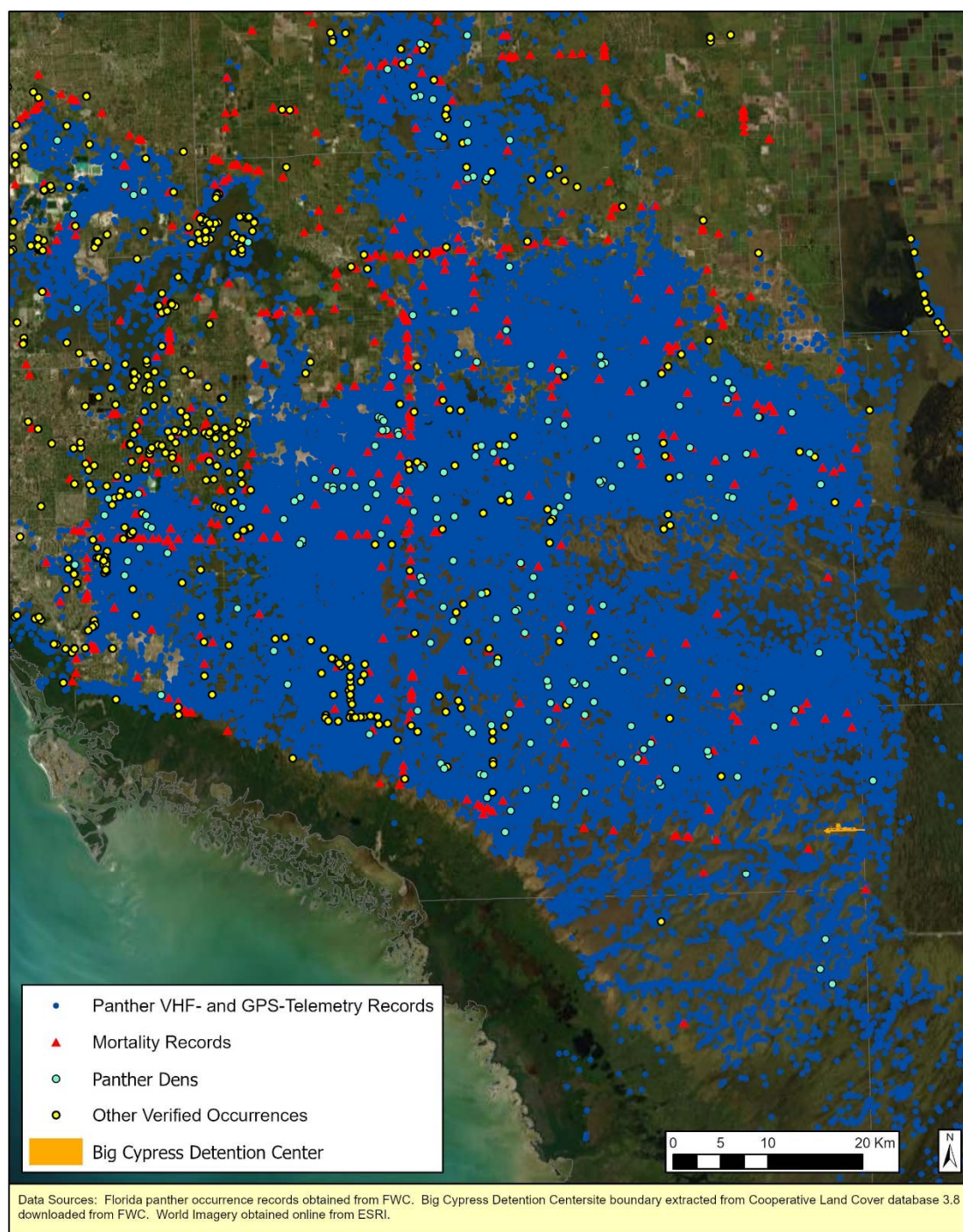


Figure 6. The Big Cypress Detention Center is in an area with many documented occurrences of panther since 1982.

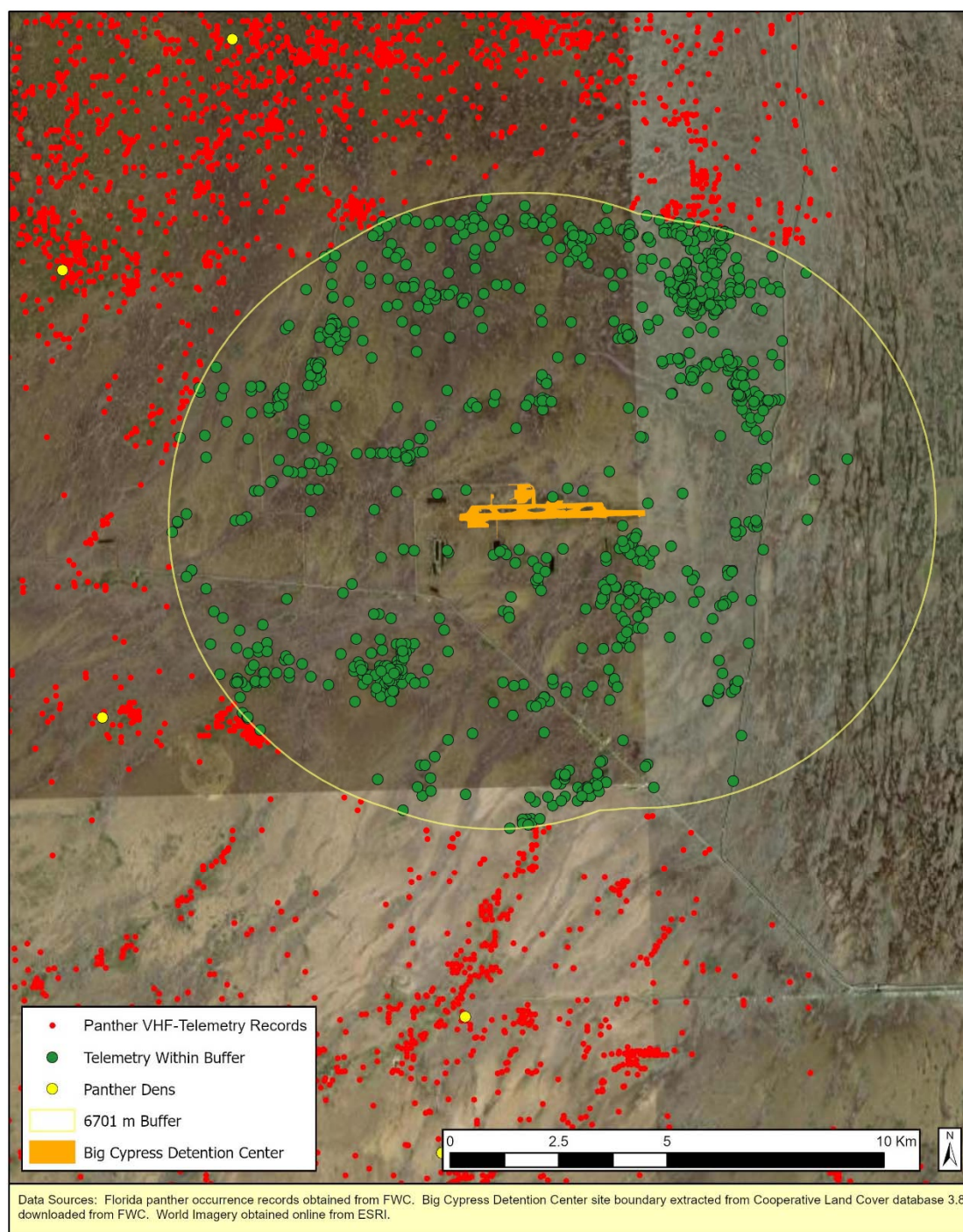


Figure 7. VHF-telemetry records of Florida panthers collected between 1982 and 2014 within 6701 m (i.e., mean daily travel distance of male panthers in the dry season) of the Big Cypress Detention Center.